Stacking device for strip segments, especially for textile strip segments provided with end folds

Technical field

The invention relates to a stacking device for strip segments, especially for textile strip segments provided with end folds, as defined in the preamble to patent claim 1. Such strip segments are, in particular, textile labels.

Prior art

Stacking devices of the type stated in the introduction are already known, such as, for example, from US-A-3 846 960. There, the strip segments are deposited in a stacking shaft. To this end, the labels are initially deposited on opposing hold-down devices and then pressed into the stacking shaft by means of press-down devices when the hold-down devices are withdrawn. The hold-down devices are then extended again prior to the withdrawal of the press-down devices into the starting position. Disposed in the stacking shaft is a shaft floor, connected by friction engagement with a guide. As the build-up of the stack progresses, the shaft floor is also retired. This is done with the aid of the press-down devices whenever the compressive force of the press-down devices surmounts the friction force of the frictional engagement between the shaft floor and the guide. The end folds of the strip segments have the tendency to return to the original stretched position and thereby generate a spreading force which is very detrimental to the stacking operation, since the stack of strip segments acts as an elastic mass which can only be compressed with difficulty by the press-down devices and tends to expand. This also results, in particular, in the free portions of the strip segments between the hold-down devices bulging upward and jeopardizing perfect stack formation. The removal of the thus compressed stack contained the risk of the

stack of the falling apart if the shaft floor is not further retired by the time the stack is relieved of pressure. This must possibly be done manually, which is awkward.

Representation of the invention

The object of the invention is to improve a stacking device of the type stated in the introduction.

The object is achieved according to the invention by virtue of the characterizing features of claim 1.

With the aid of the light barrier, the bulging of the strip segments in the stacking shaft in the build-up of the stack can be monitored and, whenever this bulging exceeds a predetermined measure and breaks the light barrier, the motorized drive of the shaft floor is activated and triggers a retirement of the shaft floor at least to the point where the light barrier is once again unbroken, preferably, however, to the point where the bulging of the strip segments is eliminated and these are lying substantially flat again. The additional extent of the retirement is preferably adjustable. This offers the basic advantage that the lowering of the shaft floor is not effected by the press-down devices but by a motorized drive of the shaft floor, thereby allowing a smooth and controlled build-up of the stack in the stacking shaft. Even difficult-to-handle strip segments made of heavy textile materials can thus be treated perfectly well. This allows a controlled stack build-up, since the tensions present in the stack build-up can be kept to a controlled minimum. After the completion of the stack build-up, it is also possible by means of the motorized drive to lower the shaft floor further, so that a virtually tension-free stack can be obtained which can also easily be reworked, for example, by a packing container being slipped over the obtained stack build-up.

Advantageous configurations of the stacking device are indicated in claims 2 to 16.

The stacking shaft can be assigned to strip segments of specific size. A configuration as claimed in claim 2 is advantageous, however, in which the side walls is adjustable to the length of the strip segments to be stacked.

For the transportability of the shaft floor, various configuration options present themselves. For instance, the shaft floor can be transported by a drive mechanism for its back. Particularly advantageous, however, is an embodiment as claimed in claim 3, in which the shaft floor is assigned a slide which is movably disposed on a side wall. According to claim 4, this slide can have a dedicated drive. More advantageous is an embodiment as claimed in claim 5, using a linear gear. Such a linear gear may, for example, be a spindle or a chain drive. Particular preference is for a rotary toothed belt. The arrangement of the drive mechanism on a side wall produces high flexibility for the stacking shaft, since the drive mechanism is then displaceable with the side wall. A configuration as claimed in claim 6 is also advantageous. This enables the slide and/or the configuration of the shaft floor to be adjusted to a variable width of the stacking shaft and hence to a corresponding length of strip segments. To this end, it is expedient if, according to claim 7, the support facing away from the slide is designed as a connecting member displaceable on the assigned side wall.

The flexibility of the stacking shaft can be improved if the side walls according to claim 8 have on the back rear wall strips, thereby not only simplifying the mutual adjustability of the side walls, but also additionally improving the support of the stack of strip segments in the stacking shaft.

The stacking shaft can be arranged in any chosen position, horizontally for instance. More advantageous, however, is an embodiment according to claim 9, since the depositing of the strip segments is easier if the stacking shaft is vertical. It is advantageous if the stacking shaft is angled slightly backward, so that the strip segments bear against the rear wall and the stack cannot tilt forward. The guidance of the stack of strip segments in the stacking shaft can be improved by a configuration of the stacking device as claimed in claim 10. A guide member disposed between the side walls of the stacking shaft and extending over the length of the stacking shaft is expediently configured such that the distance of the guide member to the rear wall of the stacking shaft and, where appropriate, its position between the side walls are adjustable.

According to claim 11, the stacking shaft is preferably open in the upward direction and designed such that a packing container can be slipped over the stack of strip segments in order to grasp the stack and remove it from the stacking device.

Particularly advantageous is an embodiment of the stacking device as claimed in claim 12, according to which the stacking lock is fixed and the stacking shaft is displaceable parallel to the rear wall, at least between the stacking position and an end-loading position. According to claim 13, an additional stand-by position can be provided. For the displaceability of the stacking shaft, various design options present themselves. Particularly advantageous is a configuration as claimed in claim 14, according to which the rear wall is configured as a fixed back plate, on which the side walls of the stacking shaft are disposed such that they are displaceable transversely to the stacking direction.

According to claim 15, the hold-down devices are expediently configured as laterally extensible and retractable pins. Their mutual spacing allows the press-down devices to reach through between them. The latter, according to claim 16, are expediently configured as rakes which can be swung in and out against the stacking shaft.

Brief description of the drawings

Illustrative embodiments of the invention will be described in greater detail below with reference to the drawings, in which:

figure 1 shows a stacking device, in fragmented, schematic representation from the front;

figure 2 shows the stacking device of figure 1 along the section II-II of figure 1, yet with retired press-down device and without drive mechanisms.

Ways to realize the invention

Figures 1 and 2 show a stacking device as is suitable, for example, for a cutting and folding plant according to WO 01/66343. The stacking device contains a stacking shaft 2 having two opposing side walls 4, 6 and a rear wall 8. Supported on a retirable shaft floor 10 is a stack 12 of strip segments 14, which are provided on both sides with end folds 16. Arranged upstream of the stacking shaft 2 is a stacking lock 17, which has retirable hold-down devices 18 and retirable press-down devices 20, which alternately engage on the strip segments 14.

More specifically, the stacking shaft 2 is formed by the rear wall 8, configured as a back plate, from which the side walls 4, 6 are hung such that they are displaceable via guide members 22. The side walls 4, 6 are equipped with rear wall strips 24, which point toward one another and against which the strip segments

14 bear with their front sides and which additionally rest on the back plate 8. It is thereby possible to adjust the mutual spacing of the side walls 4, 6 to the length of the strip segments 14.

The shaft floor 10 contains a slide 26 assigned to a side wall 4, which slide is transportable on a rail 28 of the side wall 4. The slide 26 can have a dedicated drive, though, in the present example, it is preferably connected to a linear gear 30, formed of a rotary toothed belt driven by a motor 34. Attached to the slide 26 is a guide 36 extending over the maximum width of the stacking shaft, which guide is preferably formed of two guide rods 38. Disposed on the guide rods are supports 40, 42, which are adjustable in terms of their mutual spacing and against which floor parts 44 rest. The floor parts are individually selected according to the width of the stacking shaft 2 and, where appropriate, other desired characteristics. Advantageously, the floor parts consist of foam rubber, so that they can be compressed. Hence, no change of floor parts is necessary if the width of the stacking shaft is altered. A support 42 is additionally designed as a connecting member, which is disposed displaceably on the associated side wall 6 and, moreover, is jointly transported whenever the side wall 6 is laterally displaced along the guide rods 38. Where appropriate, the support 42 can be fixedly connected by fixing screws 46 to the guide rods 38 in order to fix the distance between the side walls 4, 6.

As is evident, in particular, from figure 2, the stacking shaft 2 is angled slightly backward in order to aid the depositing of the strip segments 4 in the stacking shaft 2. This can be further aided by a guide member 48, which extends substantially over the length of the stacking shaft. The guide member 48 is attached to a stand 50 on the side wall 6 by means of a coupling piece 52. A fixing screw 54 in the coupling piece 52

cooperates with the stand 50 and allows vertical adjustment of the guide member 48. A further fixing screw 56 cooperates with the guide member 48 and allows adjustment of the position of the guide member 48 between the side walls 4, 6. The guide member 48 can thus be adjusted precisely to the dimension of the stack 12 of the strip segments 14.

In figure 1, the stacking shaft 2 occupies the stacking position in which it cooperates with the fixed stacking lock 17 containing the hold-down devices 18 and the press-down devices 20. The hold-down devices 18 are configured as laterally extensible and retractable pins 60, which are mutually spaced and are driven via a lever gear 62 operated by a control cam 64. The lever gear 62 is pretensioned against the control cam 64 with a pretensioning spring 66. The press-down devices of 66 is pretensioned against the control cam 64. The press-down devices are configured as rakes 68 which can be swung in and out against the stacking shaft 2 and are likewise driven via a lever gear 70 and a control cam 72, against which the lever gear 70 is pretensioned by means of a pretensioning spring 74. In place of the control-cam-operated lever gear for the hold-down devices 18 and press-down devices 20, other drives can also be envisaged, such as, for example, fluid-operated piston/cylinder units, step motors and the like. Assigned to the hold-down devices 18 is a light barrier 76, which is connected to the drive mechanism of the shaft floor 10 by a control device (not detailed).

The modus operandi of the stacking device is as follows.

When the press-down devices 20 are swung out, the hold-down devices 18 are free and prevent the stack 12 of strip segments 14 from expanding upward. By means of a feed device (not detailed), for example feed pincers, an incoming strip segment 14 with end folds 16 is

deposited on the hold-down devices 18, whereupon the press-down devices 20 swing in. As soon as the press-down devices 20 are up against the strip segment, the hold-down devices 18 are withdrawn and the press-down devices can deposit the strip segments on the stack. Thereupon, the hold-down devices 18 are reextended and reach between the teeth of the rake of the press-down devices 20. The latter can thereupon be extended back out of the stacking shaft 2 into the position shown in dashed representation to allow a new strip segment 14 to be deposited on the hold-down devices 18. This stacking operation is continuously continued until, owing to the inner tension of the stack, strip segments arch upward and break the light barrier. The drive of the shaft floor 10 is thereupon activated and the shaft floor is lowered, by means of the drive mechanism, at least to the point where the light barrier is unbroken. Where appropriate, the lowering can be realized with overmeasure to the point where the strip segments are lying substantially flat. A smooth and meticulous stacking, even of difficult strip segments, in particular, for example made of thicker, stiff textile materials, is thereby perfectly possible. As soon as the stacking shaft 2 is filled to the desired height, the stacking operation is interrupted, the shaft floor is relowered to the point where the stack of strip segments 14 is released from the stacking lock 17 and the stacking shaft 2 can be displaced laterally into an unloading position (not detailed). In this position, a packing container can then be slipped into the upwardly open stacking shaft and over the stack 12 of strip segments 14 for the stack of strip segments to be taken up into the packing container. The empty stacking shaft 2 can be fed back to the stacking lock 17 or transported into a stand-by position (not detailed).

Reference symbol list

2	Stacking shaft
4	Side wall
6	Side wall
8	Rear wall, back plate
10	Shaft floor
12	Stack
14	Strip segment
16	End fold
17	Stacking lock
18	Hold-down device
20	Press-down device
22	Guide member
24	Rear wall strip
26	Slide
28	Rail
30	Linear gear
32	Toothed belt
34	Motor
36	Guide
38	Guide rod
40	Support
42	Support
44	Floor part
46	Fixing screw
48	Guide member
50	Stand
52	Coupling piece
54	Fixing screw
56	Fixing screw
60	Pin
62	Lever gear
64	Control cam
66	Pretensioning spring
68	Rake
70	Lever gear
72	Control cam
74	Pretensioning spring
76	Light barrier